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EPA Superfund
Record of Decision:

29TH & MEAD GROUND WATER CONTAMINATION
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Text:

RECORD OF DECISION

COLEMAN OPERABLE UNIT
29TH & MEAD SUPERFUND SITE
WICHITA, KANSAS

SEPTEMBER, 1992

United States Environmental Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

COLEMAN OPERABLE UNIT
29TH & MEAD SUPERFUND SITE
RECORD OF DECISION DECLARATION

SITE NAME AND LOCATION

Coleman Operable Unit, 29th & Mead Site
Wichita, Kansas (Sedgwick County)

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected interim remedial action for the ground water and final remedial action for the soils at the Coleman Operable Unit, 29th & Mead Site, in Wichita, Kansas, chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. Section 9601 et seq., and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300.

This decision is based on the administrative record for the Coleman Operable Unit, 29th & Mead Site. The United States Environmental Protection Agency (EPA) and the Kansas Department of Health and Environment (KDHE) agree on the selected remedy.

ASSESSMENT OF THE SITE

The actual or threatened release of hazardous substances at or from this operable unit, if not addressed through the implementation of the response actions selected in this Record of Decision (ROD), present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The Remedial Investigation/Feasibility Study (RI/FS), conducted by the Coleman Company and Evcon Industries from June 1991 to July 1992 at the Coleman Operable Unit of the 29th & Mead Site, identified the primary route of exposure for future use is through domestic use of water from existing or new water wells either at, or downgradient, of the operable unit.

In addition, available data shows elevated concentrations of volatile organic compounds in soils as a principal threat to the ongoing contamination of ground water.

Detectable levels of trichloroethene, 1,1,1 trichloroethene, tetrachloroethane, cis 1,2 dichloroethene, 1,1 dichloroethene and vinyl chloride have been detected in the ground water. Most of these organics, including toluene, have been detected in the soil at various locations on the site.

This remedy will address the principal threat posed by the contaminants in the ground water by preventing the further migration of contaminants off the Operable Unit onto the 29th and Mead Site and by eventually restoring the ground water to acceptable quality (Safe Drinking Water Act Maximum Contaminant Levels-MCLs) by the extraction and treatment of contaminated ground water. The remedy will further reduce the threat of continued contamination of the ground water from the soil source areas with the expansion of the soil vapor extraction system.

The major components of the selected remedy for the affected ground water and soil include the following:

- Enhancement of the existing ground water extraction and treatment system with the addition of a withdrawal wellon the south boundary of the Operable Unit hooked up to the existing ground water treatment system.

- Monitoring of the ground water collection/treatment system and the ground water contaminant plume during ground water remediation activities.

- Expansion of the existing soil vapor extraction (SVE) system to remediate other source areas within the Operable Unit.

- Monitoring of the SVE system to determine performance and establish its maximum attainable goals.

- Monitoring of the emissions from the ground water treatment system and the soil vapor extraction system to ensure the health and safety of on-site personnel and determine if additional treatment of emissions is necessary.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that permanently and significantly reduces toxicity, mobility, or volume as a principal element. Because this remedy may result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure, a review will be conducted no less often than every five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

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1.0 SITE BACKGROUND

1.1 SITE LOCATION

The Coleman Operable Unit is located within the north-central part of the 29th and Mead Superfund Site, a 1,440 acre industrial area in northcentral Wichita, Kansas (see Figure 1). The Coleman Operable Unit is occupied by Evcon Industries, Inc. at 801 East 37th Street North, and by Recreational Vehicle Products (RV Products), located at 3010 North Mead Street (see Figure 2). Evcon occupies the former Coleman Heating, Ventilation, and Air Conditioning facility which includes a manufacturing plant (North Plant) that occupies approximately 60 percent of the Coleman Operable Unit, and an Administration and Engineering (A&E) Building which occupies approximately 30 percent of the Coleman Operable Unit. The remaining 10 percent of the Coleman Operable Unit area is occupied by RV Products. The southern boundary of the Coleman Operable Unit is approximately 300 feet south of East 30th Street North.

The Coleman Operable Unit is surrounded by other industrial facilities such as a cardboard box manufacturer, a meat packing facility, a structural concrete manufacturer, grain elevators, a chemical manufacturing company, a railroad track, a petroleum products packaging facility and the location of a former metals fabricating company.

1.2 PHYSICAL SETTING

The Coleman Operable Unit lies within the Arkansas River lowlands section of the Central lowlands Physiographic province, which is characterized as relatively flat. Unconsolidated deposits underlying the Coleman Operable Unit are approximately 40 feet in depth and consist of clay, silt, sand, andgravel. These deposits represent at least four major depositional episodes, which range in age from the Early Pleistocene to Recent Alluvium. The Wellington Formation, which comprises the impermeable bed beneath the unconsolidated deposits, consists of calcareous gray and blue shale containing several thin beds of argillaceous limestone, gypsum, and anhydride.

These unconsolidated deposits are the primary source of usable ground water in Sedgwick County. The direction of ground water flow in the unconsolidated materials is generally south, although there are local variations caused by the pumping of a recovery well and several industrial wells currently operating on the Coleman Operable Unit. Each industrial well has an average pumping rate of approximately 250 gallons per minute (gpm), and one of the wells must always be in operation to support Evcon operations. Groundwater flow velocity is estimated at 340 feet per year.

1.3 HISTORY

The Coleman Operable Unit is located in an area which has been used primarily for industrial purposes since 1887. Various operations at the Coleman Operable Unit property prior to Coleman's occupation of the property include the manufacture of railway cars, automobiles, light aircraft, and electronically controlled aircraft. Coleman acquired the property in 1947 from the Trustee of Culver Aircraft Corporation through a bankruptcy proceeding. Coleman initiated the manufacture of household furnace and air conditioning units at the Coleman Operable Unit property in 1949.

Evcon purchased the northern part of the Coleman Operable Unit property in 1990, and is the current owner/operator of these facilities. Evcon operations include the production of consumer furnaces and air conditioning systems intended for use in conventional residences and manufactured homes. The manufacturing process begins with coils of steel, which are cut and formed intoappropriate shape for assembly by welding into the proper configuration for furnace or air conditioning casings and other parts. The steel is then cleaned with solvents, painted, and mated with purchased components to complete the process.

The remainder of the Coleman property was purchased in 1987 by RV Products, which manufactures air conditioners for recreational vehicles.

1.4 PAST INVESTIGATIONS AND RESPONSE ACTIVITIES

EPA, the United States Geological Survey and KDHE began investigating groundwater contamination in the 29th and Mead area in 1983. These investigations revealed the presence of several volatile organic compounds (VOCs), including trichloroethylene (TCE), carbon tetrachloride, toluene, benzene, ethylbenzene, methylene chloride, trans and/or cis 1,2 dichloroethylene, vinyl chloride, and 1,1,1-trichloroethane (TCA), in the groundwater at the 29th and Mead Site. In May 1987, several water samples were collected at the Coleman facility from the effluent of cooling water from two on-site industrial water wells. The results of this sampling indicated elevated levels of several VOCs, which included TCE, TCA and 1,1 dichloroethene. These results prompted an investigation at the Coleman Operable Unit to determine the source, magnitude and extent of these contaminants.

Successive (phased) investigations conducted between 1987 and 1988, which included monitoring well installation and sampling, soil gas surveys, aquifer tests and pilot tests, indicated several potential source areas for VOC contamination existed at the Coleman facility. A comprehensive list of investigative documents is included as Attachment II.

In 1988, Coleman and KDHE agreed that a groundwater recovery and treatment program and a soil vapor extraction program should be designed and implemented to control further migration of contaminants from the Coleman Operable Unit property. This system became operational in 1988 and included a 62 point soil vapor extraction system to treat contaminated soils in a 65,000 square foot area and a groundwater recovery and treatment system that currently utilizes two (2), 40-foot by 4-foot diameter air strippers. Water from the system, subsequent to treatment, is discharged to the Wichita Drainage Canal in conformance with a National Pollutant Discharge Elimination System (NPDES) permit that was issued by KDHE.

The 29th and Mead Superfund Site, which includes the entire Coleman facility, was officially listed on the Superfund National Priorities List (NPL) on February 21, 1990. The Coleman Company was identified as one of the potentially responsible parties (PRPs) for the 29th and Mead Superfund Site. The Coleman Company and Evcon Industries asked KDHE and EPA to consider the area covered by the interim groundwater and SVE system as an operable unit within the 29th and Mead Superfund Site, since an interim recovery system was operational prior to the 1990 NPL listing. An operable unit is any action taken within a small area of a site as one part of an overall site cleanup. On June 6, 1991, a Consent Agreement was signed between KDHE, The Coleman Company and Evcon Industries to conduct a Remedial Investigation and Feasibility Study (RI/FS) at the Coleman Operable Unit.

The objectives of the RI/FS included: (1) characterization of VOC contamination in groundwater and soil through evaluation of past investigative data and collection of supplementary data; (2) development and evaluation of alternatives for appropriate remedial response actions needed to control or mitigate effects of VOCs present at the Coleman Operable Unit; and (3) to determine the appropriate means of remediating the concentrated area of contamination beneath the structures at the Coleman Operable Unit.

1.5 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Community participation was provided in accordance with CERCLA, as amended by SARA and, to the extent practical, the National Contingency Plan. Community participation highlights include the availability of several key documents in the administrative record, a public comment period and a public hearing.

A community relations plan for the 29th & Mead site was completed by KDHE and approved by EPA in June of 1990. This document lists contacts and interested parties throughout government and the local community. It also establishes communication pathways to ensure dissemination of pertinent information.

The administrative record for 29th & Mead site was released in June of 1990. The administrative record for the Coleman Operable Unit was released on July 15, 1992. The records have been made available to the public at the following addresses:

Kansas Department of Health and Environment
Bureau of Environmental Remediation
Forbes Field, Building 740
Topeka, Kansas   913/296-3393

Kansas Department of Health and Environment
Wichita District Office
1919 Amidon, Suite 130
Wichita, Kansas   316/838-1071

United States Environmental Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas   913/551-7000

A press release was issued on July 14, 1992 announcing the availability of the administrative record, the release of the Proposed Plan and notice of the Public Hearing for the Coleman Operable Unit.

A public hearing was held on July 28, 1992 to present the Proposed Plan. At this meeting representatives of EPA and KDHE were available to answer questions and record comments concerning the Proposed Plan.

All comments received by EPA and KDHE prior to the end of the public comment period are addressed in the Responsiveness Summary in this Record of Decision.

This decision document presents the selected remedy for the Coleman Operable Unit of the 29th & Mead Site. The decision for this Operable Unit is based on the administrative record.

1.6 SUMMARY OF THE REMEDIAL INVESTIGATION

1.6.1 Activities

The RI consisted of six primary components: (1) review of existing data; (2) installation of monitoring wells, soil vapor points and soil borings; (3) conducting a shallow zone aquifer test; (4) executing an aquifer sparging pilot test; (5) executing soil vapor extraction tests; and (6) completing an extensive groundwater sampling and analysis program. Each of these activities is discussed in greater detail below.

1.6.2 Conclusions

Soil samples were collected from seven active or inactive degreaser pits and from the north and south fields of the Coleman Operable Unit property to evaluate potential source areas at the Coleman Operable Unit. Figure 3 is a map showing potential source areas.

Results indicate that trichloroethene (TCE) was detected in 23 soil borings from eight source areas. Concentrations of TCE in the soil ranged from not detected (ND) to 13,000 micrograms per kilogram (ug/kg) or parts per billion (ppb). Other significant VOC constituents detected during the soil sampling program and their respective concentration range includes: 1,1,1 trichloroethene (TCA) - ND to 6,100 ug/kg; tetrachloroethane (PCE) - ND to 41 ug/kg; cis - 1,2-dichloroethene (1,2 DCE) - ND to 520 ug/kg; 1,1 dichloroethene (1,1 DCE) - ND to 370 ug/kg and toluene - ND to 140,000 ug/kg. This data suggests that former degreaser pits 1, 2, 3, 4, 6, 7 and 8, and the south field are likely sources for TCE contamination. In addition, significant concentrations of TCA were observed in former degreaser pits 1, 2 and 4. A soil vapor extraction (SVE) pilot test was conducted in several source areas identified by soil testing to determine the feasibility of using SVE technology as a remedial alternative. SVE technology involves withdrawing air from the soil pore spaces to remove VOCs from the soil and then releasing the vapors to the atmosphere. The SVE pilot study results indicate that SVE technology will effectively remove contamination from the soil at the Coleman Operable Unit. These conclusions can also be supported by the fact that the existing SVE system has been successful in overall reduction of contaminants from the north field area where an estimated 8,990 to 14,323 pounds of VOCs have been removed from the soil during the operation of the SVE pilot system.

Groundwater samples at the Coleman Operable Unit have been collected during several sampling events. In May 1990, a total of 68 monitoring wells were sampled for VOCs. As part of the RI, 35 monitoring wells were resampled to verify previous results. Figure 4 shows relative locations of monitoring wells at the Coleman Operable Unit and Attachment III summarizes results from the July 1991 sampling event.

Analytical results indicate that TCE is the predominant VOC detected at the Coleman Operable Unit. TCE was detected in 32 of 35 monitoring wells sampled during the July 1991 sampling event. Concentrations of TCE ranged from ND to 15,000 micrograms per liter (ug/l). Other significant VOCs detected during the groundwater sampling program and their respective concentration ranges include: TCA - ND to 3500 ug/l; PCE - ND to 100 ug/l; 1,2 DCE - ND to 2500 ug/l; 1,1 DCE - ND to 1,110 ug/l; and vinyl chloride - ND to 250 ug/l.

Information gathered during the RI defined both the vertical and horizontal extent of contaminated groundwater at the Coleman Operable Unit with the exception of an area downgradient of the RV facility. Figures 5, 6 and 7 show the groundwater flow direction and area of TCE contamination in deep and shallow zones within the aquifer as determined by the RI. As indicated by the isoconcentration contours (Figures 6 and 7), there may be one or more off-site sources which may be contributing to the contamination at the Coleman Operable Unit. These additional source areas will be investigated during the 29th and Mead RI/FS.

Several aquifer tests have been completed at the Coleman Operable Unit. The purpose of these tests was to determine characteristics of upper and lower portions of the alluvial aquifer, evaluate pumping effects on the groundwater regime and provide information for remedial alternative evaluation.

Analysis of aquifer tests indicates a transmissivity of 96,000 gallons per day per foot (gpd/ft) for the entire alluvial aquifer and 20,000 gpd/ft for the upper aquifer (above a localized clay layer). Groundwater flow is generally southward with a velocity of 340 feet per year. Results indicate properly placed recovery wells will assure hydraulic control of groundwater contamination at the Coleman Operable Unit.

An aquifer sparging test was also conducted during the RI to determine the feasibility of using aquifer sparging as a remedial alternative. Aquifer sparging involves pumping air down into the ground water to enhance the volatilization of VOCs in the ground water. Results from the pilot test indicate aquifer sparging would enhance removal of VOCs from ground water and soils within the saturated zone when used in conjunction with a SVE system.

2.0 SUMMARY OF RISKS PRESENTED BY THE COLEMAN OPERABLE UNIT

As part of the RI/FS a Baseline Risk Assessment (BRA) of the Coleman Operable Unit was completed in November, 1991, by PRC Environmental Management, Inc. under contract to the U.S. Environmental Protection Agency. The objectives of the BRA were to assess the magnitude and probability of actual or potential harm to public health and the environment by releases of hazardoussubstances from the Coleman Operable Unit in the absence of remedial action (i.e. the "no-action" alternative). As part of the BRA, PRC reviewed remedial investigation reports, identified contamination, assessed exposure pathways and toxicity, characterized risk, and completed the report. The BRA report was based predominantly on data collected during the remedial investigation.

2.1 CONTAMINANTS OF CONCERN

The initial phase of the BRA included compiling a list of contaminants from results of the various sampling activities that were measured above detection limits or natural background levels. There have been 22 organic compounds identified in groundwater, surface water, and soils at or near the Coleman Operable Unit. The chemicals that contribute most significant impact are as follows: 1) 1,1 dichloroethane; 2) 1,1 dichloroethene; 3) 1,2 dichloroethene; 4) trichloroethene; and 5) tetrachloroethene.

The contaminants of concern, the detection frequency, range of detected concentrations, and mean chemical concentrations are provided in Attachment IV.

2.2 EXPOSURE ASSESSMENT

The BRA focused on potential or actual risks to human health posed by contaminants at or released from the Coleman Operable Unit property. The human population most likely to be exposed to contaminated groundwater and air are those individuals living and working in the vicinity. It should be noted that the BRA for Coleman Operable Unit focused on those exposures with the highest probability of occurrence.

The BRA identified three major potential release mechanisms of the known contaminants which included: (1) the leaching of contaminants into and subsequent movement with the ground water, (2) the discharge of contaminants into surface soils, and (3) the volatilization of contaminants fromthe ground water into the ambient air via the existing recovery system (air stripper). In evaluation of the potential release mechanisms, the BRA identified several scenarios with a high probability for exposure (risk) to populations living and working in the vicinity of the Coleman Operable Unit. These scenarios, evaluated for current and future conditions included: (1) ingestion of groundwater; (2) inhalation of volatiles; and (3) ingestion of soils.

2.3 TOXICITY ASSESSMENT

Potential carcinogenic and non-carcinogenic effects associated with the major chemicals of concern (see Section 3.1) detected at the Coleman Operable Unit property are described qualitatively in the following discussion.

1,1 Dichloroethane, also known as ethylidene dichloride, is classified as a group C carcinogen (possible human carcinogen). Very high doses may produce liver and kidney lesions. Acute exposure produces local irritation and central nervous system depression.

1,1 Dichloroethene commonly known as vinylidene chloride, is classified as a group C carcinogen. 1,1 Dichloroethene is absorbed through all routes and is extensively metabolized in the liver, primarily by oxidation and conjugation. There are numerous known interactions with other compounds that cause toxic effects.

1,2 Dichloroethene and its cis-dichloroethene and transdichloroethene isomers are not demonstrated human carcinogens. The major effect of acute doses of 1,2 DCE is central nervous system depression. Repeated inhalation causes lesions in the lungs, liver and kidney.

Trichloroethene is classified as a group B2 carcinogen (a probable human carcinogen). Trichloroethene is well absorbed after inhalation and ingestion, and to some extent through the skin, and it tends to collect in fat. It has been shown to cause pulmonary adenocarcinoma, lymphoma, and hepatocellular carcinoma in multiple strains of mice. Subchronic and chronic exposures of animals to TCE appears to result in liver and kidney toxicity.

Tetrachloroethene, commonly known as perchloroethene, is a group C carcinogen. Mouse and rat studies have indicated that PCE is a teratogen and reproductive toxin. In addition, both oral and inhalation exposure of laboratory animals to PCE for intermediate and long-term exposure leads to liver, kidney and spleen toxicity.

2.4 RISK CHARACTERIZATION

The BRA evaluated potential non-carcinogenic and carcinogenic risks posed by the indicator contaminants in the various exposure media at the Coleman Operable Unit property. Carcinogenic risks were characterized in terms of upperbound excess lifetime cancer risks and non-carcinogenic risks were characterized in terms of a hazard index and hazard quotients.

Under future conditions the BRA identified potentially significant risks to human populations using groundwater at the Coleman Operable Unit as a drinking water source. The carcinogenic risk was estimated to be 1 in 1,000, or 1 x 10[3] from ingestion of groundwater, which is considered significant. The National Contingency Plan (NCP) sets forth the acceptable risk levels for Superfund sites, noting that target carcinogenic risks resulting from exposure at Superfund sites may range between 1 in 10,000, or 1 x 10[-4] to 1 in 1,000,000, or 1 x 10[-6]. Usually, remediation goals (the point of compliance) for ground water remediation are Maximum Contaminant Levels (MCLs), Kansas Action Levels (KALs) or the established clean up level for individual contaminants which would reduce risk to an acceptable level.

3.0 SCOPE AND ROLE OF RESPONSE ACTION

As discussed in Section 2.0, the BRA indicates that the greatest risk to human health could occur from future ingestion of contaminated groundwater. The primary route of exposure for future use is through domestic use of water from existing or new water wells. The point of ingestion may be either at, or downgradient from the Coleman Operable Unit. Contaminants of concern and their corresponding MCLs and KALs, as well as a summary of the maximum concentrations found, are presented in Attachment V.

Based upon the findings of the RI/FS, the following remedial response objectives have been established for the Coleman Operable Unit.

1. Prevent on-site ingestion of contaminated groundwater that would exceed respective MCLs or KALs for individual contaminants.

2. Prevent off-site migration of contaminated groundwater that would exceed respective MCLs or KALs for individual contaminants.

The conclusions of the BRA and the identification of response objectives provide the basis for selection of the preferred alternative. The preferred alternative will address the contamination by restoring the groundwater to acceptable quality (MCLs or KALs) through the extraction and treatment of contaminated groundwater. In addition, the preferred alternative will reduce the threat of continued contamination of the groundwater from soil source areas by SVE technology.

4.0 SUMMARY OF ALTERNATIVES

4.1 SCREENING AND FORMULATION OF ALTERNATIVES

The feasibility study evaluates three general response actions which could be applied to the contaminated media and conditions known to exist at the Coleman Operable Unit property. The general response categories include: (1) no action; (2) containment; and (3) treatment. The feasibility study identified and screened remedial action technologies associated with each general response action previously identified. The screening criteria used for the analysis included effectiveness, implementability and cost of the remedial action technology. Those remedial action technologies failing to meet the pre-defined criteria were screened out of the process.

Remedial action technologies were screened for applicability to the specific affected media types (i.e. soil and groundwater). The remedial action technologies evaluated for soil included: (1) containment through various capping methods; (2) excavation; (3) soil vapor extraction; (4) fixation and stabilization; and (5) biodegradation. The remedial action technologies evaluated for groundwater included: (1) containment through various technologies such as capping, hydrologic barriers and hydrologic control, and (2) treatment of groundwater by various technologies such as air stripping and carbon absorption. In addition, aquifer sparging was considered for both media types.

Individual field pilot tests were performed during the remedial investigation, utilizing aquifer sparging, soil vapor extraction, and hydraulic control by aquifer pumping, to assist in the screening and evaluation process. Based upon the results of the field pilot testing all three technologies were retained for detailed analysis.

The remedial alternatives selected for further evaluation are presented below and are discussed in more detail in Section 5.2. These alternatives, which were formulated by combining the technologies and process options that passed initial screening, are numbered to correspond with the FS report.

- Alternative 1: No. Action.
- Alternative 2A: No Further Action.
- Alternative 2B: Existing groundwater pump and treat system without the soil vapor extraction system.

- Alternative 2C: Existing system with south end enhancement by groundwater pump and treat.

- Alternative 2D: Existing groundwater pump and treat system with south end enhancement by groundwater pump and treat (no soil vapor extraction system).

- Alternative 3A: Additional soil vapor extraction in source areas with continued operation of existing groundwater pump and treat system.

- Alternative 3B: Existing system with south end enhancement by groundwater pump and treat and additional soil vapor extraction in source areas.

- Alternative 3C: Existing system with additional groundwater pump and treat system in source areas.

- Alternative 4A: Aquifer sparging and expanded soil vapor extraction in source areas with existing groundwater pump and treat system.

- Alternative 4B: Aquifer sparging and expanded soil vapor extraction in source areas with south end expansion of the groundwater pump and treat system.

- Alternative 4C: Aquifer sparging and expanded soil vapor extraction in source areas with south end and source expansion of the groundwater pump and treat system.

4.2 DETAILED EVALUATION OF INTERIM REMEDIAL ACTION ALTERNATIVES

The "No Action" alternative provides only the continued operation of the north and south industrial wells. All other remedial action alternatives considered for the Coleman Operable Unit include a number of common components. The series of remedial action alternatives designated as 2 (A, B, C and D) include operating the existing groundwater system with and without operating the existing soil vapor extraction system and enhanced pumping at the south end of the site. The series of alternatives designated as 3 (A, B and C) include operating the existing groundwater system, expanding the soil vaporextraction system, and enhanced pumping at the south and within other source areas of the site. The last series of alternatives, designated as 4 (A, B and C) are similar to the 3 series of alternatives with the addition of aquifer sparging.

The remedial action alternatives were evaluated following nine specific criteria defined by the NCP. These criteria include: 1) short-term effectiveness; 2) long-term effectiveness; 3) compliance with ARARs; 4) reduction in toxicity, mobility, and volume; 5) implementability; 6) overall protection of human health and the environment; 7) cost; 8) regulatory acceptance; and 9) community acceptance.

Described below is a summary of the detailed evaluation of each remedial action alternative. Capital costs, operation costs and maintenance costs were evaluated for each remedial action alternative. A discount factor of seven percent (7%) was used to calculate present worth costs.

ALTERNATIVE 1: NO ACTION
Estimated Capital Cost: $0.00
Estimated Annual Operation and Maintenance Costs: $42,267
Estimated Operating Life: 45 years +
Estimated Present Worth of Capital and Operating Costs: $623,310

Under this alternative, Coleman would shut down the current systems and take no additional remedial steps for removal or containment of VOCs in groundwater and soils. The two on-site industrial wells would operate with the existing water treatment system, since these wells are necessary for facility operations. Treated water from the industrial wells would be monitored through an NPDES permit prior to discharge. The estimated operating life of each remedial alternative denotes the amount of time it would take, through remedial measures, natural attenuation, or a combination of the two factors to reach the remedial action goals for the site, assuming that no further contamination is placed on the soil or into the ground water at the Coleman Operable Unit. Computer modeling was used to arrive at the number of years necessary for this to occur for each remedial scenario. The estimated operating life of this alternative, which is the amount of time it would take for the existing contamination in the soil to leach into the ground water and be carried away by the ground water flow, is over 45 years. The hydraulic control of the ground water may not be maintained by this alternative. In addition, the toxicity or mobility of VOCs in the soil would not be reduced.

ALTERNATIVE 2A: NO FURTHER ACTION
Estimated Capital Cost: $0.00
Estimated Annual Operation and Maintenance Costs: $63,400
Estimated Operating Life: 21 years +
Estimated Present Worth of Capital and Operating Costs: $802,953

This alternative would include continued maintenance and repair of the existing groundwater and soil systems, including the two industrial wells, one recovery well, two air strippers and a 62 point soil vapor extraction system. The system currently in operation at the site would remain intact without additional modification. Treated water would be monitored through an NPDES permit prior to discharge. The estimated operating life of this alternative is over 21 years. The current system has been demonstrated as being effective in the hydraulic control of groundwater migration. However, the toxicity and mobility of VOCs in the soil at recently identified source areas would not be reduced.

ALTERNATIVE 2B: EXISTING GROUNDWATER PUMP AND TREAT SYSTEM ONLY

Estimated Capital Cost: $0.00
Estimated Annual Operation and Maintenance Costs: $63,400
Estimated Operating Life: 23 years +
Estimated Present Worth of Capital and Operating Costs: $772,164

This alternative would include continued maintenance and repair of the existing groundwater system only, consisting of two industrial wells, one recovery well and two air strippers. Treated water would be monitored through an NPDES permit prior to discharge. The existing soil vapor extraction system would be eliminated. The operating life of this alternative is over 23 years. The current system has been demonstrated as being effective in the hydraulic control of groundwater migration. However, the toxicity and mobility of VOCs in the soil at recently identified source areas would not be reduced.

ALTERNATIVE 2C: EXISTING SYSTEM WITH SOUTH END ENHANCEMENT BY PUMP AND TREAT Estimated Capital Cost: $43,000 Estimated Annual Operation and Maintenance Costs: $78,900 Estimated Operating Life: 20 years Estimated Present Worth of Capital and Operating Costs: $972,334

Under this alternative, the existing groundwater and soil systems, which consist of two industrial wells, one recovery well, two air strippers, and a 62 point soil vapor extraction system, would continue to operate without modification. An additional recovery well would be installed at the southern boundary of the property to enhance hydraulic control of the contaminated groundwater. The new recovery well would be installed in the same manner as the existing recovery well and be operated at approximately 200 gpm. Water would be pumped to an existing on-site air stripper. Treated water would be monitored through an NPDES permit prior to discharge. The estimated operating life of this alternative is 20 years. In addition to enhancing the hydraulic control of contaminated groundwater, this alternative would reduce the time needed for remediation within the Coleman Operable Unit. However, the toxicity and mobility of VOCs in the soil at recently identified source areas in the south field of the Coleman Operable Unit property would not be reduced, as no SVE system would be implemented in that area under this alternative.

ALTERNATIVE 2D: SAME AS 2C WITHOUT EXISTING SOIL VAPOR EXTRACTION SYSTEM
Estimated Capital Cost: $43,000
Estimated Annual Operation and Maintenance Costs: $78,000
Estimated Operating Life: 22 years
Estimated Present Worth of Capital and Operating Costs: $983,131

Alternative 2D maintains the existing groundwater system, consisting of the two industrial wells, one recovery well, and two air strippers. An additional recovery well would be installed at the southern boundary of the Coleman Operable Unit property to enhance hydraulic control of the contaminated groundwater. The new recovery well would be installed in the same manner as the existing recovery well and be operated at approximately 200 gpm. Water would be pumped to an existing on-site air stripper. Treated water would be monitored through an NPDES permit prior to discharge. Under Alternative 2D the current soil vapor extraction system would be eliminated. This would not reduce the toxicity and mobility of VOCs in the soil at the north field of the property, because although the existing system has removed large amounts of contaminants from the soil, some contamination would remain. The estimated operating life of this alternative is 22 years. Alternative 2D would be effective in the hydraulic control of contaminated groundwater and would reduce the time needed for remediation. However, the toxicity and mobility of VOCs in the soil at recently identified source areas of the Coleman Operable Unit property would not be reduced.

ALTERNATIVE 3A: ADDITIONAL SOIL VAPOR EXTRACTION IN SOURCE AREAS
Estimated Capital Cost: $421,000
Estimated Annual Operation and Maintenance Costs: $63,400-166,700
Estimated Operating Life: 19 years
Estimated Present Worth of Capital and Operating Costs: $1,450,513

Under this alternative, the existing groundwater and soil system, which consists of two industrial wells, one recovery well, two air strippers and the north field 62 point soil vapor extraction system, would continue to operate. The soil vapor extraction system would be expanded for removal of VOCs from unsaturated soils in all known on-site source areas, including the source areas in the south field area of the property. Estimates indicate that this alternative will remove VOCs from over 4,000,000 cubic feet of affected soil. The soil vapor extraction system would be expanded to include 96 additional soil vapor extraction points that would be screened from approximately 5 to 20 feet below ground surface. Based upon the soil vapor extraction pilot study, approximately eight blowers would be needed to implement this alternative. It is anticipated that treatment of gases vented from the soil would not be required. The estimated operating life of this alternative is 19 years. This alternative would be effective in the hydraulic control of contaminated ground water in the north field; however, contaminated ground water could still escape from the property's southern boundary under this scenario. In addition, the overall load of VOCs leaching into the groundwater from active source areas would be greatly reduced by soil vapor extraction.

ALTERNATIVE 3B: SAME AS 3A WITH SOUTH END ENHANCEMENT BY PUMP AND TREAT
Estimated Capital Cost: $464,000
Estimated Annual Operation and Maintenance Costs: $78,900-182,200
Estimated Operating Life: 18 years
Estimated Present Worth of Capital and Operating Costs: $1,638,456

Alternative 3B, the selected alternative is a combination of the existing system with an additional recovery well and expanded SVE system. Under this alternative, the existing groundwater and soil system, which consists of two industrial wells, one recovery well, two air strippers and a 62 point soil vapor extraction system, will continue to operate. The soil vapor extraction system will be expanded for removal of VOCs from unsaturated soils in all known on-site source areas. Estimates indicate that this alternative will remove VOCs from over 4,000,000 cubic feet of contaminated soil. The soil vapor extraction system will consist of 96 additional soil vapor extraction points that would be screened from approximately 5 to 20 feet below ground surface. Based upon the soil vapor extraction pilot study, approximately eight blowers will be needed to implement this alternative. Performance criteria for the expanded SVE system will need to be developed during remedial design. Monitoring of the performance of the existing SVE system will both allow for the development of the criteria for the expanded

SVE system and will determine when operation ofthe existing SVE system may be discontinued. It is anticipated that treatment of gases vented from the soil will not be required. However, air monitoring will need to be included to ensure the health and safety of on-site personnel and to ensure that vapors released from both the SVE system and the air strippers do not pose a threat to human health or the environment. If emissions exceed permissible levels, further treatment of the vapors may be required prior to release.

In addition to expansion of the existing soil vapor extraction system, an additional recovery well will be located along the southern boundary to enhance hydraulic control. The new recovery well will be installed in the same manner as the existing recovery well and be operated at approximately 200 gpm. Water will be pumped to an existing on-site air stripper. Treated water will be monitored through an NPDES permit prior to discharge. The estimated operating life of this alternative is 18 years. The enhanced pumping system at the southern boundary, in conjunction with the existing pumping system, will continue to mitigate off-site migration of VOCs over the long term through hydraulic control. In addition, the overall load of VOCs leaching into the groundwater from active source areas will be greatly reduced by the additional soil vapor extraction.

ALTERNATIVE 3C: SAME AS 3A WITH ENHANCEMENT IN SOURCE AREAS BY PUMP AND TREAT Estimated Capital Cost: $596,100 Estimated Annual Operation and Maintenance Costs: $139,400-242,700 Estimated Operating Life: 11 years Estimated Present Worth of Capital and Operating Costs: $2,042,339

Alternative 3C is the same as 3A with the addition of recovery wells in known on-site source areas to enhance hydraulic control. The new recovery wells would be installed in the same manner as the existing recovery well and be operated at approximately 200 gpm. Water would be pumped to an existing onsite air stripper. Treated water would be monitored through an NPDES permitprior to discharge. The estimated operating life of this alternative is 11 years. The enhanced pumping system, in conjunction with the existing pumping system, would continue to mitigate off-site migration of VOCs over the long term through hydraulic control. This alternative would also tend to substantially decrease the concentration of VOCs in the groundwater around source areas. In addition, the overall load of VOCs leaching into the groundwater from active source areas would be greatly reduced by soil vapor extraction.

ALTERNATIVE 4A: AQUIFER SPARGING AND EXPANDED SOIL VAPOR EXTRACTION SYSTEM IN SOURCE AREAS Estimated Capital Cost: $463,500 Estimated Annual Operation and Maintenance Costs: $178,400-210,200 Estimated Operating Life: 10 years Estimated Present Worth of Capital and Operating Costs: $1,746,227

Alternative 4A is the same as 3A with the addition of aquifer sparging in source areas. Aquifer sparging technology involves the introduction of air into an aquifer to increase the volatilization of dissolved VOCs in the groundwater and on soil particles. The objective is to decrease the time required for remediation. An air sparging pilot test conducted at the Coleman Operable Unit indicated this technology was effective at increasing the removal of VOCs from the aquifer. Aquifer sparging used in conjunction with the expanded soil vapor extraction system would accelerate the release of VOCs from the aquifer for capture and control. The aquifer sparging points would be installed at the base of the aquifer on top of the confining layer (Wellington Shale Formation). Estimates from the pilot test indicate that 26 cubic feet per meter of air at 60 pressure per square inch would be injected into each aquifer sparge point.

This air flow would produce an estimated radius of influence of 75 feet at each location. Air sparging provides an additional benefit by creating a high dissolved oxygen content in the surrounding soils which supports natural biodegradation of VOCs in the subsurface. The overall load of VOCs in the soil and aquifer media contaminated from active source areas would be greatly reduced by soil vapor extraction and air sparging. As with the other alternatives, the existing pump and treat system would maintain hydraulic control at the site. This alternative would also tend to substantially decrease the concentration of VOCs in the groundwater and soil around source areas. The estimated operating life of this alternative is 10 years.

ALTERNATIVE 4B: SAME AS 4A WITH SOUTH END ENHANCEMENT BY PUMP AND TREAT
Estimated Capital Cost: $506,500
Estimated Annual Operation and Maintenance Costs: $193,900-225,700
Estimated Operating Life: 9 years
Estimated Present Worth of Capital and Operating Costs: $1,799,523

This alternative is the same alternative as 4A with the addition of a recovery well at the southern boundary of the site to enhance hydraulic control of the contaminated groundwater. The new recovery well would be installed in the same manner as the existing recovery well and be operated at approximately 200 gpm. Water would be pumped to an existing on-site air stripper. Treated water would be monitored through an NPDES permit prior to discharge. The estimated operating life of this alternative is nine years. The enhanced pumping system at the southern boundary, in conjunction with the existing pumping system, would continue to mitigate off-site migration of VOCs over the long term through hydraulic control. In addition, the overall load of VOCs leaching into the groundwater from active source areas would be greatly reduced by soil vapor extraction and aquifer sparging.

ALTERNATIVE 4C: SAME AS 4A WITH ENHANCEMENT IN SOURCE AREAS BY PUMP AND TREAT Estimated Capital Cost: $638,600 Estimated Annual Operation and Maintenance Costs: $254,400-286,200 Estimated Operating Life: 5 years
Estimated Present Worth of Capital and Operating Costs: $1,711,410

Alternative 4C is the same as 4A with the addition of recovery wells in known on-site source areas to enhance hydraulic control. The new recovery wells would be installed in the same manner as the existing recovery well and be operated at approximately 200 gpm. Water would be pumped to an existing onsite air stripper. Treated water would be monitored through an NPDES permit prior to discharge. The estimated operating life of this alternative is five years. The enhanced pumping system, in conjunction with the existing pumping system, would continue to mitigate off-site migration of VOCs over the long term through hydrologic control. This alternative would also tend to substantially decrease the concentration of VOCs in the groundwater around source areas. In addition, the overall load of VOCs leaching into the groundwater from active source areas would be greatly reduced by soil vapor extraction and aquifer sparging. This alternative basically applies all the combined selected remedial action alternatives into one alternative.

5.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

5.1 SUMMARY OF EPA EVALUATION CRITERIA

The following section presents a summary of the criteria that EPA uses to evaluate remedial action alternatives.

5.1.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

5.1.2 COMPLIANCE WITH ARARs

Addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes and regulations and/or provides grounds for invoking a waiver.

5.1.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

5.1.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME

Reviews the anticipated performance of the treatment technologies a remedy may employ.

5.1.5 SHORT-TERM EFFECTIVENESS

Addresses the period of time needed to achieve protection, and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

5.1.6 IMPLEMENTABILITY

Refers to the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

5.1.7 COST

Evaluates the estimated capital cost, operation and maintenance costs, and net present worth costs.

5.1.8 STATE AND SUPPORT AGENCY ACCEPTANCE

Discusses whether, based on its review of the RI/FS and Proposed Plan, the State concurs with, opposes, or has no comment on the preferred alternative.

5.1.9 COMMUNITY ACCEPTANCE

This criteria is assessed in the Record of Decision following a review of the public comments received on the RI and FS reports, the administrative record, and the Proposed Plan.

5.2 EVALUATION OF THE ALTERNATIVES

This section profiles the performance of the preferred alternative against the nine criteria, noting how it compares to the other options under consideration.

5.2.1 OVERALL PROTECTION

The preferred alternative (3B) provides adequate protection of human health and the environment by removing contaminants in the soil and ground water and thus eliminating the risk posed by those contaminants. Alternative 3B enhances hydraulic control by minimizing the migration of VOC contaminants and treats VOCs in the soils reducing volume and mobility. Overall concentration of VOCs would decrease over time with implementation of the preferred alternative.

Alternatives 2A through 4C inclusive, provide some level of protection of human health and the environment. 2A, which provides for continued operation of the existing system, would remove contaminants from the northern end of the property, but would still permit migration of contamination from the southern field. 2B, 2C and 2D provide for various levels of contaminant removal and plume control, but each leaves some area of contamination unaddressed. Alternative 3A provides for additional soil contaminant removal, but would permit the migration of contaminated ground water from the property. Alternatives 3A, 4A, 4B and 4C each provide enhanced contaminant recovery from both soils and ground water, thus providing greater levels of protection.

Alternative 1, the "no action" alternative, does not meet the criteria for protection of human health and environment. Therefore, it is not considered as an option for the Coleman Operable Unit.

5.2.2 COMPLIANCE WITH ARARs

Applicable or Relevant and Appropriate Requirements (ARARs) are defined as Federal, State or local laws, regulations, clean-up standards, standards of control or other environmental protection standards which address specific problems at a contaminated site. There are three types of ARARs: 1) Chemical Specific ARARs, which set final concentrations of chemicals of concern in the contaminated media (i.e., soils or ground water) which the remedial action must achieve; 2) Location-Specific ARARs, which set limitations on allowable concentrations of hazardous substances because of location-specific considerations, such as critical habitats; and 3) Action-Specific ARARs, which are technology based requirements, limitations on actions taken with respect to hazardous wastes. Compliance with ARARs is not required for an interim remedial action. The remedy set forth in this Record of Decision is the final remedial action with respect to the soils at the Coleman Operable Unit. However, because the plume from the Coleman

Operable Unit is only a small portion of the ground water contamination at the 29th & Mead Site, this remedy is an interim remedy with respect to the ground water and is selected for the purposes of plume containment and mass contaminant removal. A final remedy for the ground water will be selected for the entire 29th and Mead Site at a later date. The eventual clean up levels for the ground water at the Coleman Operable Unit, as well as the 29th & Mead Site, will be MCLs and/or KALs. However, the preferred alternative complies with all identified ARARs.

Primary ARARs considered for the Coleman Operable Unit include:

1) Maximum Contaminant Levels (MCLs) as promulgated under the Safe Drinking Water Act are the relevant and appropriate standards for remediation of contaminated groundwater (Chemical-Specific).

2) Effluent limitation guidelines as governed by the Clean Water Act through the National Pollutant Discharge Elimination System (NPDES) are ARARs for any discharge resulting from site remediation, such as pump and treat (Chemical-Specific).

3) No specific ARARs exist for contaminated soils at the Coleman Operable Unit. However, performance criteria for the expanded SVE system will be developed during remedial design. Performance standards will be based on data from the monitoring of the performance of the existing SVE system. This will both allow for the development of the criteria for the expanded SVE system and will determine when operation of the existing SVE system may be discontinued.

4) No specific ARARs, other than state reporting requirements, currently exist for air emissions from the existing SVE and ground water stripping towers or for the additions to that system set forth in the preferred alternative. However, the preferred alternative provides for air monitoring to ensure the health and safety of on-site workers.

5.2.3 LONG TERM EFFECTIVENESS AND PERMANENCE

All alternatives, with the exception of the alternatives which would permit contamination to escape from the Coleman Operable Unit property, would provide for long-term effectiveness and permanence. The preferred alternative (3B) would significantly reduce the volume and mobility of VOCs in the soils through soil vapor extraction, preventing further migration of VOC contaminants into the groundwater. Enhanced groundwater recovery assures hydraulic control, providing permanent control of the migration of VOC contaminants.

5.2.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME

All alternative which provide for removal of contaminants from soil and ground water reduce the volume of contaminants at the Coleman Operable Unit. In addition, these alternatives also reduce the mobility of the contaminants by providing hydraulic control.

The toxicity of the contaminants would be reduced only through volumetric reductions in the levels of contaminants present in the soil and ground water. Only the alternatives which call for the removal of these contaminants will provide a reduction in toxicity.

The preferred alternative provides for a reduction of contaminants from the soil and ground water through treatment and recovery (volume), controls the migration of contaminants from the Coleman Operable Unit property byproviding hydraulic controls which prevent contaminated ground water from escaping from the property (mobility), and provides for treatment of contaminated ground water and soil to acceptable levels determined by EPA and KDHE (toxicity). Reduction of VOC contaminants in the soil (volume and mobility) greatly increases the overall effectiveness of cleanup and decreases time needed for cleanup.

5.2.5 SHORT TERM EFFECTIVENESS

Alternatives 2A through 2D would be less effective in addressing short term risks to the community and on-site workers during construction and implementation of the proposed remedial action, since very little additional remediation activities would be undertaken under these alternatives.

Alternatives 3A, 3B, 3C, 4A, 4B, and 4C all involve additional technologies to control and/or eliminate sources. Therefore, the short term effectiveness of these technologies would be somewhat greater than those previously described.

This criterion also provides a subjective evaluation of the estimated time to achieve cleanup. Generally, alternatives 2A through 2D would accomplish cleanup between 20 and 25 years, whereas alternatives 3A through 3C (including the preferred alternative) would accomplish cleanup within between 10 and 20 years. Alternatives 4A through 4C would accomplish cleanup within a 10 year time frame by using the most aggressive remedial alternatives.

5.2.6 IMPLEMENTABILITY

Few associated administrative difficulties which would delay implementation are associated with any alternative. Alternatives 2A, 2B, 3A, and 4A have as a common element the continued utilization of the existing groundwater recovery and treatment system; no problems are anticipated with the continued operation of this system. Alternatives 2C, 2D, 3C, 4B, 4C and the preferred alternative 3B, require slight modifications to the existing systems; however, no problems are anticipated with implementation since this technology has been used extensively. Skilled workers needed to construct the enhanced groundwater recovery and treatment system are available in this area. All permits for such systems are in place and regulated by KDHE. Plant personnel are familiar with this type of system since one has been in operation at the site for five years.

Alternatives which expand the soil vapor extraction system (Alternatives 3A, the preferred alternative 3B, and 3C) and/or add an aquifer sparging system (Alternatives 4A, 4B, and 4C) may involve compliance with substantive permitting requirements. Pilot studies for both soil vapor extraction and aquifer sparging conducted at the site demonstrated the implementability of each technology. In addition, each of these alternatives may pose technical difficulties due to locations of source areas in relation to on-site buildings and operations.

5.2.7 COST

Attachment VI includes a summary of present worth costs for each alternative evaluated in this Proposed Plan. The range of total capital and operating costs was from $2,042,339 for Alternative 3C to $623,310 for Alternative 1. The preferred alternative (3B) has an estimated total cost of $1,638,456.

The range for estimated capital cost was from $638,600 for Alternative 4C to $0.00 for Alternatives 1, 2A, and 2B. The preferred alternative (3B), has an estimated capital cost of $464,000.

The range of estimated annual operation and maintenance (O&M) costs was $286,200 for Alternative 4C and $42,267 for Alternative 1. The preferred alternative (3B) has an estimated annual O&M cost of between $78,000-$182,200.

5.2.8 STATE AND SUPPORT AGENCY ACCEPTANCE

Both the Kansas Department of Health and Environment and the U.S. Environmental Protection Agency support the preferred alternative. 5.2.9 COMMUNITY ACCEPTANCE

EPA received comments from the Coleman Company, Inc. No other comments were received during the public comment period.

6.0 SELECTED REMEDY

* ALTERNATIVE 3B:

Estimated Capital Cost: $464,000
Estimated Annual Operation and Maintenance Costs: $78,900-182,200
Estimated Operating Life: 18 years
Estimated Present Worth of Capital and Operating Costs: $1,638,456

The preferred alternative is a combination of the existing system with an additional recovery well and expanded soil vapor extraction (SVE) system. Under this alternative, the existing groundwater and soil system, which consists of two industrial wells, one recovery well, two air strippers and a 62 point soil vapor extraction system, will continue to operate. The soil vapor extraction system will be expanded by the addition of 96 more soil vapor points for removal of VOCs from unsaturated soils in all known on-site source areas. In addition, a recovery well will be located along the southern boundary to enhance hydraulic control.

The rationale for the selection of the preferred alternative is premised upon the following:

- Extensive investigations at the Coleman Operable Unit have identified eight (8) definitive sources of VOC contamination with concentrations as high as 13,000 ug/kg. Soil vapor extraction pilot studies conducted at the Coleman Operable Unit have conclusively shown the effectiveness of SVE on the soil contamination in the area.

- The existing interim soil vapor extraction system is documented as being effective in the removal of VOC contaminants from on-site soils. Estimates indicate 14,323 pounds of VOC contaminants have been removed from the north field by a soil vapor extraction system in less than five years.

- Soil vapor extraction technology will significantly reduce the volume of contaminants in the soils at the Coleman Operable Unit, therefore reducing the amount of VOCs reaching the ground water.

- South end enhancement using pump and treat technology will assure that hydraulic control over the Coleman Operable Unit is maintained, thus reducing the mobility of contaminants from the site.

- The preferred alternative meets the remedial response objectives by preventing off-site migration and on-site ingestion of contaminated groundwater. In addition, the preferred alternative will significantly decrease the volume and mobility of contaminants at the site.

- The cost of Alternative 3B is not prohibitive when compared with the costs of implementing other alternatives, considering the rapid and dramatic reduction in soil and ground water contaminants provided by the inclusion of one additional ground water extraction well and the enhanced SVE system. In addition, the preferred alternative prevents further ground water contamination from VOCs in the soil as well as preventing migration of contaminants from the site for a relatively low increase in costs over other, less effective remedies.

In summary, the preferred alternative, Alternative 3B, would alleviate substantial future risks associated with ingestion of contaminated ground water through removal of contaminants from the soils and treatment of contaminated groundwater. Alternative 3B will also decrease the volume of VOCs and overall mobility of VOCs at the site. The preferred alternative is protective of human health and the environment, will maintain protection over time, and will minimize untreated waste in the soil (NCP Section 300.430 (a)(1)(i)).

Contaminated Soil

The selected remedy is the final remedy with respect to the soil at the COU. Estimates indicate that this alternative will remove VOCs from over 4,000,000 cubic feet of contaminated soil. The soil vapor extraction system would consist of 96 soil vapor extraction points that would be screened from approximately 5 to 20 feet below ground surface. Based upon the soil vapor extraction pilot study, approximately eight blowers are needed to implement this alternative. Performance criteria for the expanded SVE system will need to be developed during remedial design. Monitoring the performance of the existing SVE system will allow both for the development of the criteria for the expanded SVE system and will determine when operation of the existing

SVE system may be discontinued. It is anticipated that treatment of gases vented from the soil will not be required. However, air monitoring will need to be included to ensure the health and safety of on-site personnel and to ensure that vapors released from both the SVE system and the air strippers do not pose a threat to human health or the environment. If emissions exceed permissible levels, further treatment of the vapors may be required prior to release.

Contaminated Groundwater

The selected remedy represents an interim remedy with respect to the ground water at the COU. Because the plume of contaminated ground water at the COU has merged with the contaminated ground water from other sources in the 29th and Mead Site, the final remedy for the 29th and Mead Site will include the ground water in the COU. In addition to expansion of the existing soil vapor extraction system, an additional recovery well will be located along the southern boundary to enhance hydraulic control. The new recovery well will be installed in the same manner as the existing recovery well and be operated at approximately 200 gpm. Water will be pumped to an existing on-site air stripper. Treated water will be monitored through an NPDES permit prior to discharge. The estimated operating life of this alternative is 18 years. The enhanced pumping system at the southern boundary, in conjunction with the existing pumping system, would continue to mitigate off-site migration of VOCs over the long term through hydraulic control. In addition, the overall load of VOCs leaching into the groundwater from active source areas would be greatly reduced by soil vapor extraction.

7.0 Statutory Determinations

Under its legal authorities, the Environmental Protection Agency's primary responsibility at Superfund sites is to undertake remedial actions that achieve protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for this site must comply with applicable or relevant and appropriate environmental laws unless a statutory waiver is justified. The selected remedy also must be cost effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

1. Protection of Human Health and the Environment

The selected remedy protects human health and the environment through extraction and treatment of contaminated ground water and soil vapor. The contaminants will be permanently removed from the ground water and from the soil through volatilization.

The extraction of the contaminated ground water will eliminate the threat of exposure due to the spread of contamination to the rest of the 29th & Mead site area by checking the migration of the plume at the property boundary.

The soil vapor extraction will greatly decrease the volume of the contamination in the unsaturated zone of the subsurface soils that is contributing to the contamination of the ground water. That will reduce the time needed for the remediation of the ground water.

2. Compliance with Applicable or Relevant and Appropriate Requirements

The interim remedial action to be taken on the ground water will comply with all identified ARARs and will be consistent with the final remedy on the 29th & Mead site. The remedial action to be taken on the soils will be considered final at the Coleman Operable Unit when the performance criteria to be developed during the remedial design are met.

Action Specific ARARs:

The Clean Water Act requirements under 40 C.F.R. 122-125 for point source direct discharge will be obtained under the National Pollutant Discharge Elimination System (NPDES) by which effluent standards, monitoring requirements and standard conditions for discharge are set. A NPDES permit has been granted to both operating air stripper units on the COU site.

The Kansas Air Toxics Strategy requires only periodic reporting for air emissions from the ground water stripping towers and the SVE system. A monitoring system for both the air stripping towers and SVE system will be designed during the remedial design phase with levels established to ensure the health and safety of the on-site workers.

No permits are required for on-site activities but the additional withdrawal well will have to comply with substantive requirements of a permitas is required by the Kansas State Board of Agriculture for withdrawal of water from an aquifer.

The planned remedial actions do not warrant any specific ARARs under the Resource, Conversation and Recovery Act (RCRA). If monitoring of the emissions from the air stripping towers and/or the SVE system determine that additional treatment is necessary, then certain RCRA requirements may be applicable to the required additional treatment process(s), such as disposal of carbon filters or sludges.

Chemical Specific ARARs:

The Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs) for aquifers with Class I and Class II characteristics (i.e. irreplaceable, current or potential drinking water sources) are as follows: [levels are in micrograms per liter (ug/l)]

trichloroethene (TCE)	5 ug/l
1,1,1 trichloroethane (TCA)	200 ug/l
cis 1,1 dichloroethene (1,2 DCE)	70 ug/l
1,1 dichloroethene (1,1 DCE)	7 ug/l
vinyl chloride	2 ug/l
tetrachloroethene	5 ug/l

Location Specific ARARs:

There are no location specific ARARs that apply.

Other Criteria, Advisories or Guidance to be Considered for this Remedial Action (TBCs):

For compounds without a MCL, proposed MCL or state ground water standard, a risk based cleanup level corresponding to an excess lifetime cancer risk of 1 x 10(-6) will be calculated using slope factors for carcinogens. In cases where these levels are below a laboratory quantification limit the lowest attainable detection limit will be used as the cleanup goal.

3. Cost Effectiveness

The selected remedy is cost effective because it provides the best balance among the evaluation criteria. It provides a higher degree of overall protection than the less costly alternatives by treating all known source areas and preventing the migration of contaminated ground water from the area.

4. Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable.

EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost effective manner for the site. Of those alternatives that are protective of human health and the environment and comply with applicable standards, EPA has determined that this selected remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume achieved through treatment, short -term effectiveness, implementability, cost, while also considering the statutory preference for treatment as a principal element and considering State and community input.

The best data available to EPA and KDHE shows that elevated soil concentrations are contributing to ground water contamination in several areas on the COU site.

5. Preference for Treatment as a Principal Element

The selected remedy uses technology for ground water treatment and active soil vapor extraction for source control and thus satisfies the statutory preference for remedies that employ treatment of the principal threat which permanently and significantly reduces the toxicity, mobility, or volume of hazardous substances as a principal element.

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ATTACHMENT I

Glossary of Terms

ARARS - Applicable or Relevant and Appropriate Requirements Clean up standards, standards of control or other environmental protection requirements.

BRA - Baseline Risk Assessment - Provide an evaluation of the potential threat to human health and the environment in the absence of remedial action.

AR File - Administrative Record File - includes all pertinent documents and site information which forms the basis and rationale for selection of a remedial alternative.

CERCLA - Comprehensive Environmental Response, Compensation and Liability Act of 1980. The federal "Superfund" law.

FS - Feasibility Study. The study used to evaluate various alternatives to clean up contamination.

KAL - Kansas Action Level is a concentration that could produce chronic health effects after long term consumption of water. If a contaminant is detected at or above the KAL in a public water supply, the well must not be used for drinking water purposes.

KDHE - Kansas Department of Health and Environment.

MCL - Maximum Contaminant Level - The maximum amount of contaminant allowed in ground water by applicable regulations.

NPDES - National Pollutant Discharge Elimination System - a permit that sets standards for the discharge of potentially contaminated water.

NCP - National Oil and Hazardous Substances Pollution Contingency Plan. The procedures used to address the response powers and responsibilities created by the federal Superfund law.

NPL - National Priorities List. A list of most contaminated sites as determined pursuant to Section 105 of CERCLA.

OU - Operable Unit - An action taken as part of an overall site clean-up. A number of operable units can be incorporated in the overall plans for a site clean-up.

PRP - Potentially Responsible Party - A party who is potentially responsible for clean-up costs at a Superfund Site.

RI - Remedial Investigation - The report which identifies site conditions, extent of contamination, and site risks.

ROD - Record of Decision - The official document by U.S. EPA which selects the remedy to clean up a Superfund site.

SARA - Superfund Amendments and Reauthorization Act of 1986. The federal law which amended and extended authorization of the original Superfund law (CERCLA).

US EPA - United States Environmental Protection Agency - The support government agency for the Coleman Operable Unit.

VOCs - Volatile Organic Compounds - generally man-made chemicals that are found in many household, commercial, and industrial products. They are used widely in industrial processes, usually as solvents. VOCs in ground water are a concern due to their potential health effects.

ATTACHMENT II

Previous investigations and remediation activities are described in chronological order below:

May - August 1987: A series of temporary groundwater monitoring points were installed with the goal of identifying source(s) of VOCs impacting groundwater.

September 1987: A limited soil vapor survey was conducted in the north field.

December 1987: Four monitoring wells were installed to characterize aquifer conditions and to serve as monitoring points for a future aquifer pumping test.

March 1988: A groundwater pumping test was conducted in RW-1 to determine aquifer parameters.

April 1988: A soil ventilation feasibility test was conducted in the northern portion of the North Plant property. The test was conducted in areas that were previously identified by soil vapor surveys as being contaminated.

July 1989: Soil sampling was conducted at selected locations.

August 1989: A soil vapor extraction system test was conducted to determine optimum vapor extraction point locations, air flow rates, and radii of influence.

January 1990: A site investigation report was submitted to KDHE and EPA. This report detailed the results of the activities listed above. These included the installation of 27 monitoring wells; monitoring well sampling and analysis for metals, VOCs, pesticides, and semivolatile organics; soil sampling and analysis for VOC and metals; evaluation of the performance of the existing groundwater and soil vapor remediation systems; and an assessment of the presence of liquid separate-phase organic compounds beneath the site.

December 1989 through April 1990: Ten shallow monitoring wells were installed to characterize the shallow groundwater system, and ten monitoring wells couplets were installed to characterize on-site and off-site deep and shallow groundwater systems.

May 1990: Samples from all monitoring wells were collected and analyzed to document the effectiveness of the operational remediation systems.

May - August 1991: RI activities were conducted as outlined in the KDHE-approved RI Work Plan for the COU. These activities consisted of a soil boring/sampling program, soil ventilation test, aquifer pumping test, aquifer sparging test, and sampling groundwater from selected monitoring wells.

ATTACHMENT V

Maximum Concentrations, MCLs, KALs

CONTAMINANT	[(a)] [*]MCL	[(b)] [*]KAL	[(c)] [*]MAXIMUM CONCENTRATION
1,1,DICHLOROETHANE	-	5	75
1,1,1,TRICHLOROETHANE	200	200	3500
TRICHLOROETHENE	5	5	21000
TETRACHLOROETHENE	5	7	43
TOLUENE	2000	2000	LESS THAN 80
1,1 DICHLOROETHENE	7	7	1300
TRANS 1,2 DICHLOROETHENE	-	70	3100

<Footnotes>
*ALL UNITS ARE PARTS/BILLION

(a) Data taken from an EPA memorandum dated April 11,1991.
Subject: Update to Numeric Action Levels for Contaminated Drinking Water Sites

(b) Data taken from a Kansas Department of Health and Environment memorandum dated December 5, 1988.
Subject: Revised Groundwater Contaminant Cleanup Target Concentrations For Aluminum and Selenium

(c) Data taken from a report by Groundwater Technology, Inc. entitled
Report of Remedial Investigation Activities
Coleman Operable Unit Wichita, Kansas - Dated September 3, 1991
</footnotes>